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AN ATLANTIC PIPEFISH CAUGHT IN TRANSIT THROUGH THE PANAMA CANAL

The following note may be of some interest to ichthyologists, ecologists, zoogeographers and others. On August 7, 1928 I caught an active and apparently healthy Atlantic pipefish while searching among the weeds and grasses in the shallow water along the shore of Gatun Lake, Canal Zone. This was in an inlet near the landing of the Barro Colorado Island biological laboratory.

This pipefish was carrying about 220 young embryos, all normal in appearance, in its abdominal brooding organ. Each embryo was contained in a cup developed in the skin, and the cups were arranged in open honeycomb-like form. Dr. Carl L. Hubbs, University Museums, University of Michigan, to whom the specimen was submitted for identification, has found that this fish has had no legal generic name for reasons given in a paper still in press, and has named it *Oostethus lineatus* (Kaup). He gives its range as chiefly the brackish waters of the tropical Atlantic coast of the new world, but states that it extends its range into purely fresh water, and probably into the sea as well.

The Suez Canal as a means of dispersal of marine fishes has been considered by a number of authors. Norman ('27) has recently summarized the available information on this subject. As pointed out by Hubbs ('27) the remarkable distinctness of the fish faunas of the Mediterranean and Red Seas so long evident to ichthyologists is being reduced due to the fact that certain species have been able to pass through the Suez Canal and thus greatly extend their ranges. I am also informed by Dr. Hubbs that Dr. C. H. Eigenmann ('20) at one time gave some attention to the relation of the Panama Canal to the transference of Atlantic and Pacific drainage freshwater fishes. He did not consider the Canal as a means of dispersal of

marine fishes, however. The taking of the pipefish here recorded suggests a process of dispersal of marine fishes similar to that known to be taking place through the Suez Canal.

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19°9. Oostethus: A new generic name for a Doryrhamphine pipefish. Occ. Papers, 199, Mus. Zool., Univ. of Michigan. In press.

Norman, J. R., 1927., Report on the Fishes. Trans. Zool. Soc., London, 22, pt. 3, no. 12, pp. 375-390.

THE SPECIFIC NAME OF THE EUROPEAN TROUT *SALMO TRUTTA* LINNÆUS

Dr. David Starr Jordan recently submitted the following case to the International Commission on Zoological Nomenclature:

"*Salmo eriox* vs. *S. trutta* and *S. fario*. . .

"In naming the European trout, Linnæus, Syst. Nat. ed. 10, 1758, tom. I, p. 308, made it *Salmo eriox* (No. 2), *Salmo trutta* (No. 3), and *Salmo fario* (No. 4), page 309. These three names belong to one species. The two names *Salmo fario* (based on brook trout) and *Salmo trutta* (based on sea-run specimens) have both been in common use, the name *Salmo fario* most generally. *Salmo eriox*, based on the gray trout of Sweden, has line priority over both, and page priority over the name most commonly used, *Salmo fario*.

"Which name should be used? The issue lies between convenience and common usage on the one hand, and page priority and early acceptance on the other." The discussion of the case by the International Commission and the opinion on it (Opinion

No. 40) concurred in by eleven of the twelve commissioners, were as follows:

"According to Article 28, if two or more competitive names are of the same date, that selected by the first reviser shall stand. A recommendation under Article 28, provides that in absence of any previous revision, the establishment of precedence by various methods is recommended; among these methods the following is mentioned: 'Other things being equal, that name is to be preferred which stands first in the publication (page precedence).'

"According to the premises submitted, the issue lies between convenience and common usage on the one hand, and page priority on the other. Accordingly all other things are not equal in this case, and it is best to select the most commonly used name, which under these premises is *Salmo fario*. (See also note by Stejneger.)

"Hartert says: 'I can not agree that "accordingly all other things are not equal in that case" because in cases of priority, convenience and common usage can not decide. In Article 28 evidently "all other things being equal" is meant in the sense of "all names being equally available." The greatest convenience is undoubtedly page priority, and as it is the only one which admits no discussion (convenience and common usage being uncertain quantities), it alone must decide.'

"Jentink says: '*Salmo eriox* is the first published name like also *Chaetodon acuminatus*, and they have therefore priority.'

"Jordan says: 'I personally much prefer the recognition of line and page priority as giving absolute fixity. But I agree that the above is the rule and shall abide by it.'

"Stejneger says: ' concur, as per appended separate vote.'

"According to the premises submitted, the issue lies between convenience and common usage on the

one hand, and page priority on the other, but as a matter of fact the issue lies in the question as to who first united the three Linnæan specific names *eriox*, *trutta*, and *fario*, and which of the three names did he select for the united species. I call attention to the fact that Professor Robert Collett so united them in 1875 (Norges fiske, p. 157) and that he selected *eriox* as the collective name, thus: '125. [*Salmo*] *eriox*, Lin. 1766. *Salmo eriox trutta*, *fario* Lin. Syst. Nat. ed. 12, tom. I, p. 509.'

"This action must stand unless it can be shown that somebody else made a different selection before 1875."

Dr. Jordan has since agreed with Dr. Stejneger, stating in *Copeia* (No. 29, 1916, p. 28) that:

"Opinion 40 with special note by Dr. Stejneger confirms *Salmo eriox* L. as the proper name of the trout of western Europe, in place of *Salmo fario* and *Salmo trutta*."

On the basis of this reasoning however, the proper name of the trout of western Europe is neither *fario* nor *eriox*, but apparently *Salmo trutta* Linnæus, under which name Widegren (Ofvers. Vetensk. Akad. Förhandl., 19, 1862, p. 560) united among other nominal forms, "*S. eriox*, *trutta*, *fario*, och *carpio*, Linné." Widegren believed that these names were all based on one species which assumes different appearances in diverse types of environment. Dr. Günther, in his catalogue of the Fishes of the British Museum (Vol. 6, 1866, p. 104), after stating this view of Widegren, remarked: "He names this species *Salmo trutta;* so that Scandinavia and the remainder of Europe would be, in fact, inhabited by two species only, viz. this *S. trutta* and *S. salar*."

The taxinomic status of the various forms of trout inhabiting the streams of western Europe is not wholly settled, but the current opinion is that they

are only races or subspecies, perhaps only environmental variations. If any of these three views is held, then, upon the basis of Article 28 and Opinion 40 (with appended note by Stejneger) of the International Commission on Zoological Nomenclature, the nominal forms of trout inhabiting western Europe (excepting of course the salmon, *Salmo salar*) should be united under a common specific name, *Salmo trutta*, unless it can be shown that some reviser of these nominal species combined them and chose a different specific name for the united species, prior to Widegren's revision of 1862.

(On the basis of all this, the European Trout should stand as *Salmo trutta*.—D.S.J.)

C. L. Hubbs

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SOME CONSIDERATIONS IN THE STUDY OF THE EFFECTS OF HEAT AND LIGHT ON FISHES

Recent experiments at the College of Fisheries indicate that the problems of physiology are far from simple, and it is suspected that many investigators have been misled by the apparent simplicity of the reactions of the fish to various stimuli. It is pointed out that there may be a similarity of response to different stimuli which makes difficult the separation of the various causes for the effect.

Thus, in the study of the effects of light on developing fish and eggs, we find it impossible to distinguish between the effects of light and those of heat, and the effects of heat seem to be inextricably bound to the

effects of a varying oxygen supply. It may be that many other factors also are involved which depend on immeasurable quantities of dissolved materials.

In the use of colored glasses placed between the eggs or fish and a source of light, it was observed that red light yielded results similar to those obtained in total darkness. Green and yellow lights seemed to be optimum for young salmon, while under the blue light there was the heaviest loss and the slowest rate of growth. These results are so much in accord with what one might suspect from the usually supposed effects of various light wave lengths that the temptation would be to conclude that the shorter wave lengths are damaging to the fish. This is not borne out by the use of ultra-violet rays gave very diverse results, depending on wave length and time of exposure, ranging from favorable to adverse. If the fish were actually burned, death would result.

When a sufficiently sensitive thermometer was used to observe the temperatures under each colored glass, it was found that the water was warmest under the red and coldest under the blue. It is well known that the speed of development of fish is governed by the temperature of the water, but very little was known about how small a difference of temperature was necessary to cause a noticeable difference in the rate of development. It appears from our experiments that probably less than 0.1 degree Centigrade will cause a noticeable effect. The observed temperature under the colored glasses varied more than this amount. Thus it is apparent that the differences in results were not caused by light alone, if indeed light had any effect. The retarded development and heavier loss under blue glass can be accounted for by the lower temperature of the water.

The oxygen contents of water vary with temperature, and speed of development of the fish depends upon the amount of dissolved oxygen which the fish

can assimilate. As the water temperature rises there is a loss of dissolved oxygen, but the speed of assimilation is greater because blood reaches the gills at a more rapid rate. Here, again, we deal in very small quantities. It was found that variations of small fractions of a milliliter of oxygen would cause a noticeable difference in the rate of growth. The loss of oxygen from the water is accompanied by changes in hydrogen-ion concentration, which are known to affect the fish. Here, again, the differences in rate of development of the fish, or eggs, under the colored glasses can be accounted for by other things than the effect of light.

It has been found, also, that the acceleration or retardation of development can be accomplished in other ways than by changing the temperature of the water, or by varying the oxygen content. If accumulations of carbon dioxide gas from respiration are not rapidly removed, the rate of development is slower than otherwise. If salmon eggs are partially covered with vaseline to render part of the surface impervious to exchange of gases then it is seen that those eggs with the most surface so covered develop at the slowest rate. In a similar manner eggs in the middle layers of deep hatching baskets are retarded in development because so much of their surfaces is covered by other eggs.

Thus it has been shown that no noticeable differences in development of fish or eggs necessarily is accounted for by exposure to colored lights. It is probable that the effects of colored lights are not different from those of heat. The effects of actinic rays vary according to their wave length and time of exposure to them. Infra red radiations were the same in effect as heat. Indeed these rays are continuous in series with heat rays on one side and colored light on the other. Blue light appears to be at a neutral point between the effects of heat and the effects of actinic rays.

Mast (1914) has shown that light perceived by the eyes of a fish may be the stimulus causing changes in the coloration of the skin. Other investigators have shown that modifications in coloration may be caused by anaesthetics or adrenalin, (epinephrin) etc. Excess of acids or alkalies in the water also cause changes in color.

It therefore is pointed out that problems dealing with the physiology of fishes are apt to lead into many phases of physics and chemistry not clearly understood when applied to living fishes.

D. R. CRAWFORD

College of Fisheries

SOME EMBRYOLOGICAL NOTES OF *HYNOBIUS NAEVIUS*[1]

Hynobius naevius (Schlegel) ("Buchi-sanshouô")[2] is a salamander indigenous to Japan. It lives near a mountain stream, and spawns usually under stones in the stream in the later part of March. A pair of egg-sacs, each containing some fourteen or fifteen eggs, are laid at a time. The egg is white in color, with much yolk, and has a diameter of about 5 mm.

In a week after spawning, gastrulation is completed, and soon after this neural folds are formed. For the completion of the neural groove about ten days are required.

After a fortnight the fusion of the neural folds takes place and the head part is distinguishable. In two or

1. Contributions from the Zoological Laboratory, Kyûshû Imperial University, No. 16.

2. Buchi, spotted or mottled; sanshôuo, salamander.

three days after this the head becomes more distinct. Posterior to the eyeballs arise the rudiments of the external gills and on the hinder part of the body the tail appears. At this time the embryo measures 8 mm. in length, bent a little, and holds a round yolk mass on the ventral region.

After another week, i.e., three weeks after spawning, the embryo becomes straight and measures 15 mm. in total length, the head being about 2 mm., the tail about 5 mm. The external gills consist of three pairs of rods and measure 1 mm. The fore-limbs now project and the nostrils appear. In the eyes black pigment appears. On the tail arises the fin, and now the yolk mass becomes elongated, lying along the body. After two or three days the external gills increase in length more and more, and little branches spring up from them. The rudiments of the hind-limbs now become visible. Pigment gradually appears over the surface of the body.

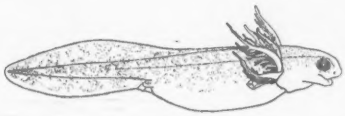

Fig. 1

By the end of the fourth week the total length attains 19 mm., external gills measure 5 mm., and two or three toes appear on the fore-limbs.

Thus in the fifth week the embryo hatches out. At this time the total length is 21–22 mm., the fore-limbs measure 2 mm., and the hind-limbs 1 mm. In the abdomen there still remains a good quantity of yolk. This hatched-out larva has no balancing-sticks (balancers) and generally lies on its side on the bottom of the water, remaining in this posture till the time when the fore-limbs are strong enough to perform their function. Fig. 1 shows the larva just hatched out.

(In his report on the Japanese salamanders, Tago[3] writes an account on the development of *H. naevius*. His descriptions, however, lead me to think that he is dealing with some other species of *Hynobius* than *naevius*.)

JUNJI OYAMA

3. Tago, K. Nihon Sanshôuo no Kendyû. (Japanese). Dôbutsugaku Zasshi, Vol. 19. 1907.

REPTILES AND AMPHIBIANS FROM PAWNEE COUNTY, OKLAHOMA*

Due to the efforts of Mr. J. W. Peery, superintendent of schools at Quay, Oklahoma, a representative collection of reptiles and amphibians from Pawnee County has been received by the Museum. Because of the fact that no collections have hitherto been reported from this section of the State, the list of species is herewith presented.

Bufo woodhousii Girard
Acris gryllus (Le Conte)
Crotaphytus collaris collaris (Say)
Phrynosoma coronatum (Blainville)
Ophisaurus ventralis (Linnaeus)
Cnemidophorus sexlineatus (Linnaeus)
Leiolopisma laterale (Say)
Eumeces fasciatus (Linnaeus)
Eumeces guttulatus (Hallowell)
Opheodrys aestivus (Linnaeus)
Masticophis flagellum flagellum (Shaw)
Masticophis flagellum flavigularis (Hallowell)
Coluber constrictor flaviventris (Say)
Elaphe laeta (Baird and Girard)
Pituophis sayi (Schlegel)
Lampropeltis calligaster (Harlan)
Storeria dekayi (Holbrook)

*Contribution from the Zoological Laboratory of the University of Oklahoma, Second Series, No. 91.

Tropidoclonion lineatum (Hallowell)
Thamnophis sauritus proximus (Say)
Thamnophis sirtalis sirtalis (Linnaeus)
Tantilla gracilis Baird and Girard

A. I. ORTENBURGER

Museum of Zoology,
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A NOTE ON *ANNIELLA NIGRA* FISCHER

During a recent stay in Pacific Grove, Monterey County, California, advantage was taken of an exceptionally low tide (Feb. 22, 1929) to investigate the fauna about the rocks off Lighthouse Point (Point Pinos). All the rocks could be reached without wading except one quite far out. At high tide the water completely insolates these rocks from all mainland connections. About two hundred feet or more from the mainland is a small islet, a level plateau about fifty by sixty feet and perhaps eight or nine feet above high tide line. Although never submerged it is subject to the spray from the breakers. There are no trees or shrubs on it, only grass and very low growing plants such as the common "loco weed". The northern portion is covered by an old shellmound of at least two feet in thickness. Just how long this islet has been cut off from the mainland is not known.

It was while kicking around in the surface debris of this shellmound that a specimen of *Anniella nigra*, the black legless lizard, was discovered. Further search was made but no other specimen was to be found at that time. There is no doubt but that there are other individuals on the islet and future search may find them.

This record extends the range of this species from the mainland to an isolated islet, although the distance involved is perhaps not more than two hundred feet.

In coloration this specimen more closely resembles the lighter forms of *A. pulchra* from the southern part of California (Museum of Vertebrate Zoology collection). In life it was notably silver and not black or even dark. The dorsal line of dark color is one scale wide while the lateral lines vary from several wide at the head to two for the greater length of the body. Some of the measurements are: length from head to anus 60 mm., width of head 4 mm., width of tne body 3.5 mm. taken at approximately 1.5 cm. posterior to the head, length of tail about 24 mm., the end was broken off but saved. The scales are so very tiny that it is extremely difficult to count the scale rows. The scales on the head correspond in number and arrangement to Van Denburgh's description of the genus.

This lizard is no doubt an immature of *A. nigra* but due to scant comparative material it is impossible to be certain. All specimens of both species at hand are more than twice the length of this one. The very light coloration may well be due to age, since only *A. nigra* has been reported from the Monterey peninsula.

M. E. MUSGRAVE

U. S. Dept. of Agriculture
Bureau of Biological Survey

BUFO ALVARIUS, A POISONOUS TOAD

Although I have been intimately acquainted with toads of this species for the past ten or twelve years and have at various times handled them and carried them about in my car, it was not until the evening of September 1, 1928, that I realized what a dangerous amphibian *Bufo alvarius* could really be upon occasion.

Just about sundown of that evening I was looking over a planting in the front of our home when I discovered a large green toad in a standpipe used for irrigation purposes. I lifted the big fellow out and

dropped him over the side. Our little wire haired fox terrier, standing nearby made a dash at the toad, but I spoke to her and she stepped back. Immediately the toad swelled himself up, hissed at the dog and hopped a little way toward her. That was too much, the dog immediately grabbed him and in one shake the toad was dead. I was leaning over the standpipe and my face was perhaps four or five feet from the toad while she was shaking it.

About this time a large police dog that is a visitor at our home ran up and touched his nose to the toad; the little terrier snatched it away. I thought no more of it and started back to the house, the big police dog following. He had gone no more than a hundred feet when his front legs crumpled under him and he pitched forward. However, he gathered himself and then tipped backwards, his legs and body being paralyzed.

Immediately I realized that something was wrong and looking over to where the little terrier had been I saw her lying on the ground with her feet crumpled under her and her face in the dirt. I ran over and picked her up and found that she had fallen on top of the toad as she was carrying it. I felt her heart and found the action slow, and although she gasped and did her best, she could get no air into her lungs. Within two or three minutes from the time she first bit the toad she died. Immediately after death, bloody foam oozed from her mouth and nose.

About that time I became very sick myself, my head was swimming, and there was a lifting feeling in my lung cavity. It affected me rather peculiarly, as I wanted to walk and keep walking. I took a large dose of warm salt water and after disgorging what I had in my stomach I felt better. However, the effects did not wear off for about thirty minutes. The old police dog also revived in about three quarters of an hour.

I do not know whether I got the effects of the poison while leaning over the standpipe or while

working with the little dog, as I pried her mouth open and tried to get salt water down her. I did not detect any odor whatsoever. I am quite sure that I did not get the poison from the toad before the dog attacked it, although I did lift it with my hand, but this I have done on many occasions before without experiencing any trouble. I also handled with no ill effect, a toad of the same species that was later sent to the Bureau of Biological Survey, Washington, D. C.

Recently I have had a communication from Miss May Noble, who lives in Phoenix and who within the past few days has had a similar experience. Her Pekinese dog seized one of these green toads but Miss Noble got it away from the dog before he had hurt it to any great extent. However, the dog soon became paralyzed and Miss Noble called two veterinarians, one of whom seemed to know nothing of the effects of that sort of poisoning, but the other said it was not uncommon in this valley. Miss Noble informs me that she used ammonia with good results and that the dog recovered within an hour after it had gotten the poison. This dog, however, did not puncture the skin of the toad, only picking it up.

Just how the poison acts I do not know. My theory is that it is a gland secretion thrown out by the toad through tiny vents. Whether it forms a gas or an imperceptible spray, it comes in contact with the mucous membranes of the body and seems to do its deadly work then.

M. E. MUSGRAVE

U. S. Dept. of Agriculture,
Bureau of Biological Survey.

* * *

My own observations gathered from having kept two specimens of *Bufo alvarius* in captivity prove that they make harmless and interesting pets. I have never seen any secretion of slime from the skin glands, although I have often resorted to forcible feeding

when my toads' appetites were a little sluggish. Even the process of prying open their jaws and stuffing in angle worms or meat brought about no exudation of poison; therefore it must be only under the severest physical stress of danger or pain that the glands become active. The second individual which Mr. Musgrave sent alive to the Biological Survey is now in my possession. It seems quite satisfied to be kept in a large wooden tub containing an inch or two of water. When touched or even when it hears a noise near its tub, it inflates to a remarkable degree and remains in this condition for some time.

In Dr. Tracy Storer's book "A Synopsis of the Amphibia of California" (Univ. California Publ. Zool., Vol. 27, 1925), some brief notes are given on the life history of this toad, the largest species occurring north of Mexico, and one of the least known of all our North American amphibians. Its semi-aquatic habits restrict it to places where the water supply is constant. Irrigation ditches in southern Arizona and southeastern California provide ideal breeding places for it, and the young toads are said to develop from the egg stage in a month's time.

DORIS M. COCHRAN
U. S. National Museum

AMPHIBIANS AND REPTILES OBSERVED IN THE PALISADES INTERSTATE PARK, NEW YORK AND NEW JERSEY

The writer spent July and August, 1923, in the Boy Scout camp at the Kanohwahke Lakes in the Bear Mountain–Harriman Section of the Palisades Interstate Park, New York, doing nature study work. Some time was available for collecting and a fairly representative list of the herpetological fauna was prepared. With this was incorporated the work done in the summer of 1922 by Mr. Alvah C. Bessie and a

few notes made by myself in the Palisades Section of the Park in New Jersey. Unfortunately most of my detailed notes, with those of other work, were destroyed in 1926, but enough remains to make a list possibly of some distributional interest. Unless otherwise listed, records refer to the vicinity of the Kanohwahke Lakes.

Triturus viridescens viridescens (Rafinesque). Red efts were rather common in the woods and the water form was occasionally taken.

Ambystoma maculatum (Shaw). Not common. A few young taken.

Ambystoma opacum (Gravenhorst). One adult from a rather dry burrow in a hillside.

Hemidactylium scutatum (Schlegel). Four adults were taken about Beaver Swamp, a sphagnum swamp below Hogan Hill. One was in rubble in the ascending shaft of the abandoned Hogan Iron Mine, far up the hill. Another was under a board a few feet from the water, in very damp surroundings, while the two last were together under a tiny stick in a dry field on the other side of the swamp. Search in the water failed to net any larvae.

Plethodon cinereus (Green). Common under logs.

Plethodon glutinosus (Green). This handsome species was common in piles of rotting wood and occasional under rotten logs. It is seldom found away from rotting wood of some kind.

Pseudotriton ruber ruber (Sonnini). Occasionally taken in rocky streams throughout the Bear Mt.–Harriman Section. A single larva from a spring near the road half way between Kanohwahke Lakes and Bear Mt. *P. montanus montanus* is recorded from Orangeburg, a short distance to the south, through one old specimen in the American Museum.[1] This

1. Dr. Noble and I, and later Dr. and Mrs. Noble, visited Orangeburgh and examined muddy trickles for *montanus* without success. A native of the section told Dr. Noble that in cleaning out a muddy ditch he had uncovered numerous "red lizards."

fact made me doubly careful in examination of red salamanders but all taken were *ruber*. Digging for *montanus* in the mud near Wildcat Bridge and other likely places proved fruitless.

Eurycea bislineata bislineata (Green). A very common species along brooks.

Desmognathus fuscus fuscus (Rafinesque). Common along brooks. A careful watch was kept for *D. f. ochrophaeus* but none were seen and I do not believe the form occurs here. I have taken many *fuscus* at Ossining, N. Y.

Bufo americanus Holbrook. Not rare about the Kanohwahke Lakes. Notes on this species and the next have been given in *Copeia* No. 163, 1927, pp. 50-53.

Bufo fowleri Garman. Common. See note, as above.

Hyla crucifera Wied. Heard and collected only in the reeds near the road at the end of Little Long Pond.

Hyla versicolor versicolor (Le Conte). Common but not often seen. Heard on Hogan Hill above the upper shaft and at Bear Mt.

Rana clamitans Latreille. No definite notes other than its occurrence.

Rana palustris Le Conte. Occasionally heard calling about the lakes. *R. pipiens* was not seen within the park boundaries.

Rana sylvatica Le Conte. Occasionally seen in the woods.

Eumeces fasciatus (Linné). One specimen from the hills behind the Middle Lake. Often taken on hilltops near Suffern, a little to the south, and at Greenwood Lake, N. J.

Diadophis punctatus edwardsii (Merrem). A few taken in the Park. I took an exceptionally large one, 18 inches, under a stone on a hill near Sussex (Dickertown), Sussex Co., N. J.

Heterodon contortrix (Linné). Occasionally seen. One from near Twin Lakes was of the black phase. One obtained by Bessie was attempting to swim Little

Long Pond. Commonly mistaken for the copperhead.

Liopeltis vernalis (Harlan). Rare at the lakes. Only one during summer.

Coluber constrictor constrictor (Linné). Not rare. Taken commonly on the old golf course at Greenwood Lake, N. J.

Elaphe obsoleta obsoleta (Say). Not common. One adult taken under a tent at Camp Cropsey. A spotted young one was taken when it crossed the path before me high up the talus slope of the Palisades, a mile or so south of the state line.

Lampropeltis triangulum triangulum (Lacepede). Young and adults commonly taken.

Natrix sipedon sipedon (Linné). Common along streams.

Storeria dekayi (Holbrook). Not common.

Storeria occipito-maculata (Storer). One taken in 1922 by Bessie. Decidedly not common.

Thamnophis sirtalis sirtalis (Linné). Common.

Thamnophis sauritus (Linné). Occasional.

Agkistrodon mokasen Beauvois. Copperheads were rather common over the whole Park and occasionally wandered into the camps. One was taken by Mr. W. G. Holbein and the writer at the foot of the Palisades a mile or two below the state line.

Crotalus horridus Linné. Rattlesnakes were as common or commoner than copperheads. One was found sunning itself on a camp dock, but in general they are more shy than the copperheads.

Sternotherus odoratus (Latreille). I did not see this turtle at the Kanohwahke Lakes but it was common at Twin Lakes.

Chelydra serpentina (Linné). Snappers were rare in the Kanohwahke Lakes but common at Twin Lakes.

Clemmys guttata (Schneider). Not common at the lakes. Seen in ponds above the Palisades near Ft. Lee.

Clemmys insculpta (Le Conte). Common in woods. Several young with flat shell and long tail taken at the Kanohwahke Lakes.

Clemmys muhlenbergii (Schoepff). One adult from a little swamp below the dam at the end of the Third Lake was taken by Bessie in 1922.

Terrapene carolina carolina (Linné). Common in woods. One young specimen obtained near the Kanohwahke Lakes. This with the young wood turtles and the single *muhlenbergii* were in the collection at the Scout Museum when I left.

Chrysemys picta (Schneider). Not common.

GEORGE S. MYERS

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BALANCER IN *DIEMICTYLUS PYRRHOGASTER* AND IN *HYNOBIUS NEBULOSUS*[1]

Diemictylus pyrrhogaster (Boie) ("Imori")[2] and *Hynobius nebulosus* (Schlegel) ("Kasumi-sanshouo")[3] are both urodeles indigenous to Japan. The larvae of both these species have balancers which are much alike in their development, structure, and function. But they differ a little from each other in the changes which they undergo from the time of hatching until their disappearance. The following is a brief description to show the differences found between the two forms.

Diemictylus pyrrhogaster spawns between late spring and middle summer. The embryos hatch out within from two to four weeks after spawning according to the temperature of the water in which they are placed. The larvae just after hatching measure 10-12 mm. in total length, and the length of their balancer is about 1 mm. At this time the fore-limbs are of the shape of

1. Contributions from the Zoological Laboratory, Kyûshû Imperial University, No. 15.
2. Japanese name for newt.
3. Kasumi, haze or mist; sanshôuo, salamander.

short rods of 1–1.5 mm. in length, and are provided with three toes, but these fore-limbs are yet functionless. These fore-limbs, however, grow rapidly and in the course of four or five days they generally attain to a length of 2 mm. At this time they are provided with the elbow-joint and the fourth toe, and begin to perform their function. The total body-length, then, becomes 12-14 mm. increased by 2 mm. as compared to that of the time of hatching. The hind-limbs at this stage are represented by a pair of insignificant round projections 0.5 mm. high.

The balancers, on the other hand, also undergo a remarkable change during this period. As soon as the larvae hatch out of their envelopes and fall down to the bottom of the water, they assume an upright posture, supporting the body with their balancers as props. Within two or three days after hatching, the flow of afferent and efferent blood streams in the balancer generally becomes very slow and stops utterly. Gradual shrinkage in the length of the balancers then follows, and in two or three days they disappear from the surface of the body.

Examination of the sections shows clearly the cause of these phenomena. At the time when the blood flow becomes slow, there arises the growth of a peculiar plug composed of epithelial cells which have proliferated from the epidermis transversely into the interior of the balancer at the basal part of this organ, namely at the level of the body surface. This plug presses the balancer membrane and the blood vessels so as finally to obliterate them. The arrangement of the cells in the axial region of the plug, however, is so loose that the communication of blood between the interior of the balancer and the body proper is still possible. After the formation of this epithelial plug, the tissues and cells in the balancer are disintegrated gradually, to be absorbed eventually into the body. Hand in hand with this, the balancer shrinks by degrees, until it disappears completely from the skin surface. The

basal part of the balancer membrane attached to the articular process of the palatoquadrate cartilage remains for a short while after the disappearance of the balancer itself, but it has the ultimate fate soon to be absorbed (3).

Hynobius nebulosus spawns in early spring, and the embryos hatch out in about three weeks. The total length of the larvae at the time of hatching measures 12-13 mm., the balancer is then 1.25 mm. and the fore-limbs are 1 mm. long. Thenceforth the balancers increase in their length and in four or five days they reach 1.5 mm. About two weeks after hatching the balancer falls off leaving a stump-like basal part. This stump, however, disappears in a day or two from the body surface.

Examination of the sections shows the internal changes in connection with this detaching mechanism of the balancers. Like the formation of the abscis layer at the base of petioles of deciduous trees in autumn, the epithelial plug tightly fills up the basal part of the balancers before the latter are lost. The way of nutrition of the balancer being thus shut off, this balancer decays and becomes detached at the plug in a few days. The basal remnant of the balancer, as well as the basal part of the balancer membrane, are both soon absorbed. This phenomenon in *Hynobius nebulosus* is exactly the same as those observed by Harrison in *Amblystoma* (1), and by Murayama in *Hynobius fuscus* (2). About the time when the balancers are shed, the fore-limbs, on the other hand, attain the length of 2.5 mm. and begin to function.

From the above description, we may at least get an idea of some differences between the balancers of *Diemictylus pyrrhogaster* and of *Hynobius nebulosus*. In the former species the balancers become shorter after hatching until at last they are wholly lost, while in the latter species they become even longer a little after hatching and after some duration they drop off. Along with this externally visible difference in modes

of losing balancers, internally the structure of the epithelial plug which grows in both species is different, namely, in *Diemictylus pyrrhogaster* the plug is loosely formed and allows the substance to pass through it, while in *Hynobius nebulosus* it is compactly formed so as to prevent the substance from passing. The duration of the existence of the balancers is also very different between the two species. It is longer in *Hynobius nebulosus* and shorter in *Diemictylus pyrrhogaster*, though the former species is adapted to a lower temperature than is the latter.

* * *

In this connection I wish to propose for the peculiar larval organ a new name "balancing-stick" to replace the older one "balancer." The word "balancer," though it has long been used, is, at any rate, inadequate to represent this organ, if we consider its true function of supporting the larval body on the bottom of water. The other reason for my proposal is that it is desirable to make a distinction between this urodelan "balancer" and the organ of dipterous insects which bears the same name. There has as yet been no word in Japanese for this organ and I have named it "heikôshijijô" which means "balancing-stick" (3).

My thanks are due to Prof. H. Ohshima for his kindness of reading the manuscript.

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JUNJI OYAMA

NOTES ON AMPHIBIA AND LACERTILIA COLLECTED AT WEYMOUTH, N. J.

From the 16th to the 28th of June, 1928, the writer and Mrs. Klots collected at Weymouth, N. J., located about midway between May's Landing and Hammonton, in Atlantic County. Most of our attention was devoted to insect collecting, but considerable time was spent on Reptiles and Amphibia. The following captures and observations seem worthy of being recorded.

Leiolopisma laterale. Three specimens were taken, all within a radius of a half mile from camp. The first was under a brush heap in dry pine woods at eleven o'clock in the morning of a hot day. The second was under a heap of damp drift material on the bank of a creek, about noon. The third was under a log in pine woods, after a heavy rainstorm. It is probable that the paucity of records for this species from southern New Jersey is due more to its inconspicuousness and retiring habits than to its extreme rarity. Its slow movements (compared with the other Lizards found) and appearance were rather suggestive of the Salamander *Eurycea bislineata.*

Eumeces fasciatus. Six specimens in all were taken, all under the loose bark of standing pine stubs. The largest, measuring about 150 mm., was of the adult, red-headed phase. The others were all smaller and of the immature blue-tailed coloring. A female, measuring approximately 140 mm. and typical of the blue-tailed phase, deposited two eggs on July 23d in the can in which it was being kept. The lizard and the eggs were immediately transferred to a cage with a layer of sand on the bottom and above that a layer of damp sphagnum. The lizard promptly buried the eggs about two inches deep in the sand and took up its station above them. Twice the eggs were dug up, and each time the lizard buried them again. At night it burrows down to the eggs and appears to coil around them. In spite of this evident care for the eggs the lizard makes no attempt at their defense when they

are disturbed. Since writing the above the eggs have been eaten by another Skink of the same species which was placed in the cage.

Sceloporus undulatus. A considerable number of specimens of this species were taken. A large female laid five eggs on July 9th, which failed to hatch.

Other reptiles were taken or observed as follows:

Bascanion constrictor. An immature specimen, about 50 cm. in length.

Heterodon contortrix. A large specimen was found dead in the road. It was unusually black, the entire dorsum showing practically no markings.

Kinosternon subrubrum. Five specimens taken, one of which laid three eggs during the first two weeks of August.

Kinosternon pennsylvanicum. Three specimens taken.

Clemmys guttata. Exceedingly common.

Amphibia

Hyla andersonii. This Tree Frog was found to be quite common, upwards of 25 individuals in song being definitely located. The following notes on the environment and habits seem worthy of record. The writer is indebted to Dr. A. H. Wright for the use of an unpublished bibliography and of a compendium of previous observations on the species.

Many attempts have been made to reproduce the quality of the song in print, with results differing for practically every observer. Thus the call has been variously recorded as "peep", "keck", "quak" (Harper), "quack-ack" like a frightened guinea fowl, and "quank". To the writer the call seemed a nasal "quack", almost verging on a "quank" but without the strong "n" sound of the latter. The call was never disyllabic.

The note is repeated at about half-second intervals for sometimes fully 30 seconds. When the frogs are in full song an interval of about two minutes intervenes between outbursts. We had no difficulty in

starting the frogs calling again at distances of from fifty to three feet, after they had been silent for a minute or so. One individual was recorded as having called 74 times in one period of song.

The frogs definitely associate together for singing, whether because of the presence of females or for companionship. The latter probably plays a considerable share in the performance, as is evidenced by the quick response to an imitation of the call. Five such singing groups were definitely located. Of these the first contained seven individuals, the second contained three, the third contained eight, the fourth contained three and the fifth, which was just across an uncrossable creek, contained at least six. Only once was a single individual noted in song alone, and that was a frog which called three times in a spot a half-mile distant from any others and was never heard from again.

The locations of the groups were fixed, and during our stay did not change a particle. Night after night a group would be in exactly the same area, though the individuals composing it shifted position a bit.

The time of singing was remarkably constant. On every night but one the chorus started between ten and fifteen minutes before sundown. On the one exception, a clear dry night with a bright moon, the first songs were not heard until twenty minutes after sundown.

The carrying power of the song was excellent. A chorus was plainly heard as an entity over 800 paces away, with two patches of woods and a brushy swamp intervening. The wind was negligible. Individual voices were distinguishable 754 paces away down a straight road, with a light wind blowing from the observers toward the frogs.

The exact positions of ten individuals were located, of which seven were captured. High-bush Blueberry tangles festooned with Green Briars made further

investigations in this line impossible. The individuals are here referred to by number.

Numbers 1, 2, 3, 4 and 5 were in one group, within 50 feet of the main "pike" from May's Landing to Hammonton. The ground was covered quite evenly with Blueberry bushes from a foot to 18 inches high. Scattered Pitch Pines up to 12 inches in diameter stood from 10 to 30 feet apart. The ground was at most damp, and the only water nearby was a shallow pool about 30 feet away which probably dries up in the summer. Near the bases of the pines stood taller Blueberry bushes, up to three feet in height. No. 1 was sitting on the main stem of a small Blueberry bush, 18 inches from the ground and six inches from the tip of the bush. A Pine stood $1\frac{1}{2}$ feet away. No. 2 was on the leaf of a Blueberry bush, $2\frac{1}{2}$ feet from the ground and $1\frac{1}{2}$ feet from a Pine trunk. No. 3 was on a little twiglet growing out from the trunk of a pine $3\frac{1}{2}$ feet from the ground. No. 4 was on the ground at the base of a Pine. No. 5 was one foot from the ground, where the twig of a Blueberry bush lay against the trunk of a Pine. All of the specimens in this group showed a strong preference for the near vicinity of a Pine.

Nos. 6, 7 and 8 were in a thicket of small Red Maples and high Blueberry bushes in a creek "bottom." No. 6 was on the main stem of a Blueberry bush about four feet from the ground. No. 7 was similarly located. No. 8 was about six feet from the ground in a small Red Maple.

Nos. 9 and 10 were in a thick tangle of high Blueberry bushes and *Smilax*. Both were near the tops of Blueberry bushes at least nine feet from the ground. For fifty feet around none of the vegetation was any lower, so it seems that these individuals climbed higher than is usual for the species in order to be out in the open.

Not all of the individuals were as tame as is generally noted for *andersonii*. A number of individuals

would not continue singing when the observer turned the light on them or approached nearer than fifteen or twenty feet, and so could not be located. A silent *andersonii* in a thick tangle of Blueberry bushes could give points on hiding to a very small needle in a very large haystack. No females were taken.

The writer would not have presented this evidence regarding *andersonii* at such length except that in some degree it contradicts statements previously made in the literature regarding the species.

It is to be expected, of course, that individuals will always differ in different localities. It is only by taking the sum total of observations from a great many localities, and averaging it, that we dare generalize about a species, and even then we cannot do it with perfect safety.

All specimens taken have been placed in the collection of Cornell University, except the *andersonii* which were unfortunately lost after arrival in Ithaca.

ALEXANDER BARRETT KLOTS

Ithaca, N. Y.

ON SOME SKINKS OF THE GENUS *EUMECES* FROM NORTH AMERICA

Recently, when attempting to identify a skink (M.C.Z. 28383) collected by Prof. C. T. Brues on Los Coronados Islands, I observed that it combined the key characters for *Eumeces skiltonianus* and *E. lagunensis*. Van Denburgh ("Reptiles of Western North America," 1922, Vol. 1, p. 578) defines them as follows:

b. Interparietal larger than a frontoparietal, separating parietals; tail of young usually blue..... *P. skiltonianus*

b^2. Interparietal smaller than either frontoparietal, not separating parietals; tail salmon-color..... *P. lagunensis*

In the specimen before me the interparietal is larger than a frontoparietal but does not separate the parietals which are in contact behind it for half a millimetre; its tail appears to be salmon-color below.

It might be added that the right frontoparietal is tranversely divided; the seventh upper labial on the right side having undergone division there are eight labels on that side though only seven on the left. In alcohol the upper surface of the tail in its coloring appears to be merely a continuation of the dorsal pattern. With these exceptions the specimen agrees in every minutest detail of squamation and color pattern with the description of the two types of *E. lagunensis* described by Van Denburgh in 1895, and of which he states, in 1922, that they are still the only known examples. These types came from San Francisquito, Sierra Laguna, Lower California.

Van Denburgh himself (1922), under the heading "Remarks," expresses some doubts as to the validity of *legunensis*. He records *skiltonianus* as occurring on Los Coronados Islands. From the specimen in the Museum of Comparative Zoology it would appear that the form is unrecognisable unless large series from the type locality show that the characters on which it is based are reasonably constant in large series from a well defined area.

* * *

I should also like to mention—though perhaps it is already known—that *Eumeces egregius* Baird has a range in midbody scale rows of from 18 to 22. Baird originally described it as possessing "about 22." In a series of thirteen skinks in the Museum of Comparative Zoology there is only one specimen (M.C.Z. 28386) with 18 rows and only one (M.C.Z. 6152) with 22, the rest having 20 or 21, with an average for the whole series of 20. No. 28286 with the unusually low number was collected at Royal Palm Beach hammocks, Florida, by C. S. Mosier.

ARTHUR LOVERIDGE

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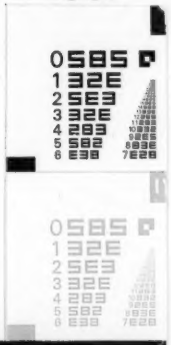
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